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PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) DOUBLE-WALLED AUXILIARY AIR INTAKE DOOR FOR A JET ENGINE

(71) We, MESSERSCHMITT-BOLKOW-BLOHM GMBH., a Company organised and existing under the laws of the German Federal Republic, of 8 Munchen 86, Arabellastrasse 1, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to air intake ducts for jet propulsion engines and is concerned with doors which open automatically to supply auxiliary air to such ducts.

The air intake opening for a jet engine must be adapted to two extreme operating conditions, i.e., to ground operation, during which the engine has to draw in the required air from outside the aircraft, and to high-speed flight, during which the air is admitted to the engine at high velocity and with a high ram pressure.

Double-walled doors for jet propulsion engine intake ducts, the doors consisting of an inner and an outer door, are known. These inner and outer doors are supported independently of each other in the airframe wall and their movements are kinematically coupled by means of a lever system. (Breguet/BAC Jaguar).

The object of the present invention is to provide a double-walled auxiliary air intake door having an improved aerodynamic design which is more simple to manufacture and is of reduced weight.

The invention achieves this object by providing a door, consisting of an inner and an outer door, in which the inner door is hinged to the wall of the intake duct and, in its closed position, conforms to the inner contour of said wall, and in which the outer door is hinged to the inner door and, in its closed position, conforms to the outer contour of the intake wall, the inner door being perforated and a tension spring being arranged between the inner and the outer doors.

The perforations or openings in the inner door prevent the inner door from being affected by the pressure differential existing between the air in the intake and the air outside the duct. Thus, the inner door only forms an extension of the inner contour of the intake wall which is required for aerodynamic purposes. Due to the perforations or openings in the inner door, the pressure in the space between the inner and outer doors automatically adapts itself to the pressure prevailing in the intake.

The actual closing element is the outer door. It is acted upon by the pressure differential on opposite faces of the door which thus controls the outer door position.

Preferably, between the inner door and the intake wall a restoring spring is arranged which is largely relaxed when the door is in the closed position. The restoring spring causes the inner door to be closed when the engine is not operating.

Advantageously, in the closed position, the inner door is arranged to butt against a shoulder at the inner contour of the intake wall and the outer door is arranged to butt against the outer contour of the intake wall with a gas-tight fit. Gas-tight closing of the outer door is absolutely necessary to prevent leakage and turbulence during high-speed flight.

An embodiment of the invention is shown by way of example in the accompanying drawings, in which:—

Figure 1 is a sectional elevation of a portion of an air intake duct for a jet propulsion engine with an auxiliary intake door shown closed, and

Figure 2 is an elevation similar to Figure 1, showing the door open.

A wall 1 of an intake duct 2 has one or more auxiliary intake openings 3, which are controlled by a double-walled door 4. This door consists of an inner door 5, which is pivoted about an axis 6 in the intake wall 1. Between the inner door 5 and the intake wall there is a tension spring 7 which is provided

to restore the inner door to the closed position as shown in Figure 1.

On the inner door itself, the outer door 8 is pivoted about an axis 9, parallel to the axis 6. Between the outer door 8 and the inner door 5 there is a tension spring 10, which is designed so that it is extended when the internal pressure of the intake duct corresponds to an air speed which is above a specific airspeed, e.g., minimum speed, the pressure in the intake duct 2 being communicated through perforations or openings 11 into the space between the inner door 5 and the outer door 8. Figure 1 shows the door 4 at an airspeed above the said minimum speed.

With the engine stopped, the aircraft stationary and no differential pressure between the interior of the intake duct 2 and the air outside the aircraft, the outer door 8 butts against the inner door 6 due to the action of the tension spring 10, but the inner door itself maintains the position shown in Figure 1. In its closed position, the inner door 5 butts against a shoulder 12 of the intake wall so that the inner contour of the intake wall 1 is aerodynamically clean. The contact surface between the outer door 8 and the intake wall 1 is made gas-tight by precise fitting or by seals.

Figure 2 shows the door 4 in a position which it assumes when the engine is running and the aircraft is stationary. In this case, the pressure in the intake duct 2 is, due to engine suction, lower than the ambient pressure so that the entire door pivots inward about axis 6 against the action of spring 7 and opens the auxiliary intake opening 3.

WHAT WE CLAIM IS:—

1. An air intake duct for a jet propulsion engine furnished with a double-walled auxiliary intake door which opens into the duct and consists of an inner door which is hinged to the wall of the intake duct and, in its closed position, conforms to the inner contour of the duct, and an outer door which is hinged to the inner door and, in its closed position, conforms to the outer contour of the intake wall, the inner door being perforated and a tension spring being arranged between the inner and the outer doors.

2. An air intake duct according to Claim 1, wherein between the inner door and the intake wall there is provided a restoring spring which is largely relaxed when the inner door is in the closed position.

3. An air intake duct according to Claim 1 or Claim 2, wherein, in the closed position, the inner door butts against a shoulder on the inner contour of the intake wall and the outer door forms a gas-tight fit with the outer contour of the intake wall.

4. An air intake duct for a jet propulsion engine substantially as described with reference to the accompanying drawings.

A. M. & WM CLARK,
5 Stone Buildings,
Lincoln's Inn,
London, W.C.2.

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1 SHEET This drawing is a reproduction of the Original on a reduced scale

FIG.1

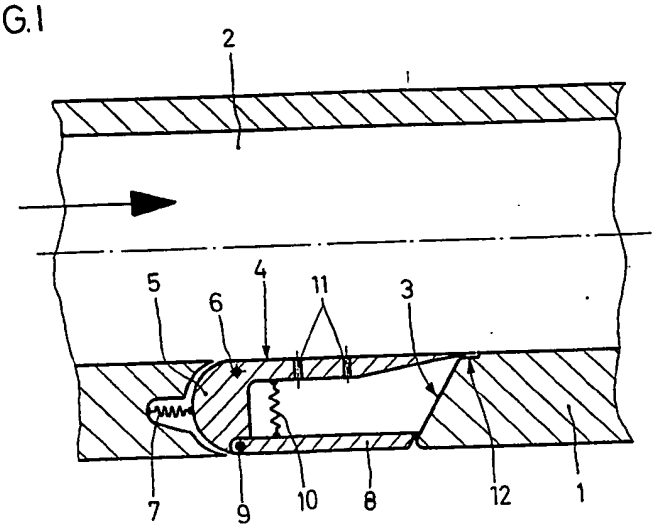

FIG. 2